## Brought to you by https://KalexamHai,GitHub.io School of Civil Engineering B.Tech. (Second Year, III<sup>rd</sup> Sem.) Major Examination (Odd) 2019-20)

Entry No:	, sem.) wajor	Examination (Odd) 2019-20)
Date: 09-12-2019		Total Number of Pages: [02]
201)	Course Title: Geotechnical	Total Number of O
	Course Code: CEI	. 2061

## Time Allowed: 3.0 Hours

Max Marks: [50]

Instructions/Note

Attempt All Questions.

Support your answer with neat freehand sketches/diagrams/ graph, wherever appropriate. ii.

ii	Assume an appropriate data / information, wherever necessary / missing	ppropria	te.
	Section A		T
Q	1. Choose the correct answer:	Marks	CO
	(a) At Shrinkage limit, the soil is:  i. Dry  iii. Partially saturated  iv. Submerged	[01]	COI
	(b) The soils which plot above the A-line in the plasticity chart are:  i. Clayey soils ii. Silty soils iv. Organic soils	[01]	CO2
	(c) The behaviour of clay is governed by:  i. Mass energy iii. Both (i) & (ii)  Surface energy iv. Neither (i) & (ii)	[01]	CO2
	(d) The hydraulic gradient is equal to the ratio of:  i. Total head to total length iii. Slope of flow line  ii. Slope of equipotential line iv Head loss to length of flow field	[01]	CO2
	i. Increases ii Remain constant iv. May increase or decrease	[01]	
	(f) Coulomb's equation for shear strength can be represented as: i. $c = s + \sigma \tan O$ iii. $c = s - \sigma \tan O$ iii. $s = \sigma + c \tan O$ iv. $s = c - \sigma \tan O$	[01]	CO3
Q2.	· · · · · · · · · · · · · · · · · · ·	[01]	CO4
\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	(b) Describe clearly one method of computing coefficient of consolidation.	[04]	CO3
	given by Oedometer test data.	[04]	CO3
()2	Section D		
Q3,	(a) The soil profile at a building site consists of dense sand up to 4 m depth, normally loaded soft clay from 4 m to 6.5 m depth, and stiff impervious rock below 6.5 m depth. The sand has a unit weight of 20 kN/m <sup>3</sup> . For the clay, unit weight is 18 kN/m3, compression index is 22% and initial void ratio is 1.30. Calculate the final settlement of the clay layer due to an increase of pressure of 30 kN/m <sup>2</sup> . Also calculate the settlement when the water table rises to the ground.	[04]	COI
	The following data refers to a silty clay that was assumed to be saturated in the undisturbed condition. On the basis of the data given below, determine the liquidity index, sensitivity, and void ratio of the saturated soil, Classify the soil according to the Unified soil classification systems.	[04]	CO3



Brought to you by https://KalExamHai.GitHub.io Assume G=2.7. Undisturbed Remolded Properties of soil sample 244 144 Strength (kN/m<sup>2</sup>) 22 22 Water content (%) 45 Liquid limit (%) 20 Plastic limit (%) 12 Shrinkage limit (%) 90 % passing no. 200 sieve Explain the principle of the direct shear test, with neat diagram. What are the [06] advantages of this test? What are its limitations? A horizontal stratified soil deposit consists of three layers each uniform in itself. The permeability of these layers are: 8×10<sup>-1</sup>cm/s, 52×10<sup>-1</sup>cm/s, and CO2 6×10<sup>-4</sup>cm/s, and their thicknesses are 7 m, 3m and 10 m respectively. Find the [06] effective average permeability of the deposit in the horizontal and vertical directions. A homogeneous earth dam has a top width of 6 m and a height of 42 metres with side slopes of 3 (horizontal) to 1 (vertical) and 4 (horizontal) to 1 (vertical) on the upstream side and downstream side respectively. The free board is 2 m. There is a horizontal filter at the base on the downstream side extending for a length of 60 m from the toe. The coefficient of permeability of the soil is  $9 \times 10^{-2}$  mm/s. With the help of flow net, find the quantity of seepage per day for 100 metre length of the dam. When an undrained triaxial compression test was conducted on specimens of clayey silt, the following results were obtained: 3 Soil sample 150 210 80 Chamber pressure (kN/m²) Q7, 175 240 300 Max deviator stress (kN/m<sup>2</sup>)

45

50

## Course Outcomes

Students will able to:

CO1. Find the index and engineering properties of the soil.

Pore pressure at max deviator stress (kN/m²)//

considering (a) total stresses and (b) effective stresses.

CO2. Determine properties & demonstrate interaction between water and soil.

With the help of Mohr circle, determine the values of shear parameters

- CO3. Analyze and compute principles of compaction and consolidation of soil.
- CO4. Evaluate the stresses in the soil mass.

CO	Questions Mapping	Total Marks	Total Number of Students (to be appeared in Exam)
COL	1(a), 3(a)	5	59
CO2	1(b), 1(c), 1(d), 5 & 6	15	59
CO3	1(e), 2(a), 2(b)& 3(b)	13	59
CO4	1(f), 4 & 7	17	59

Page 2 of 2

Je, Sn, e SJ SHS